Hand operated vacuum packing system for seed storage using a bicycle pump, DIY

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This invention was declared public domain on November 29, 1989, a gift to humanity.

A hand operated vacuum packing system (Figure 1) was developed to facilitate the storage of dry seeds. The system provides a means to seal containers with reduced oxygen content. A sealed container prevents rehydration of seeds, thus extends their viability. The reduced oxygen content suffocates adult insects that are stored with the seeds, and also extends the viability of the seeds by slowing down the seed respiration rate. This system can be used to vacuum pack dry food.

Materials:

- A bicycle tire pump, with the pump plunger seal or cup in reverse (A), and used as a vacuum pump.
- A tire inner tube stem valve (B) is used as a check valve to prevent back flow of air into the vacuum chamber.
- A lid for the vacuum chamber. The lid is made from a rubber stopper(C), a thin sheet metal or plywood (D), and a sheet of rubber made from a tire inner tube (E). The sheet of rubber (E) should be slightly larger than the lid (D) and serves as a lid gasket.
- A glass jar (F) with resealable lid is used as vacuum-sealed container.
- A large food can (G) is used as a vacuum chamber. The can should be wider and taller than the largest glass jar (F).

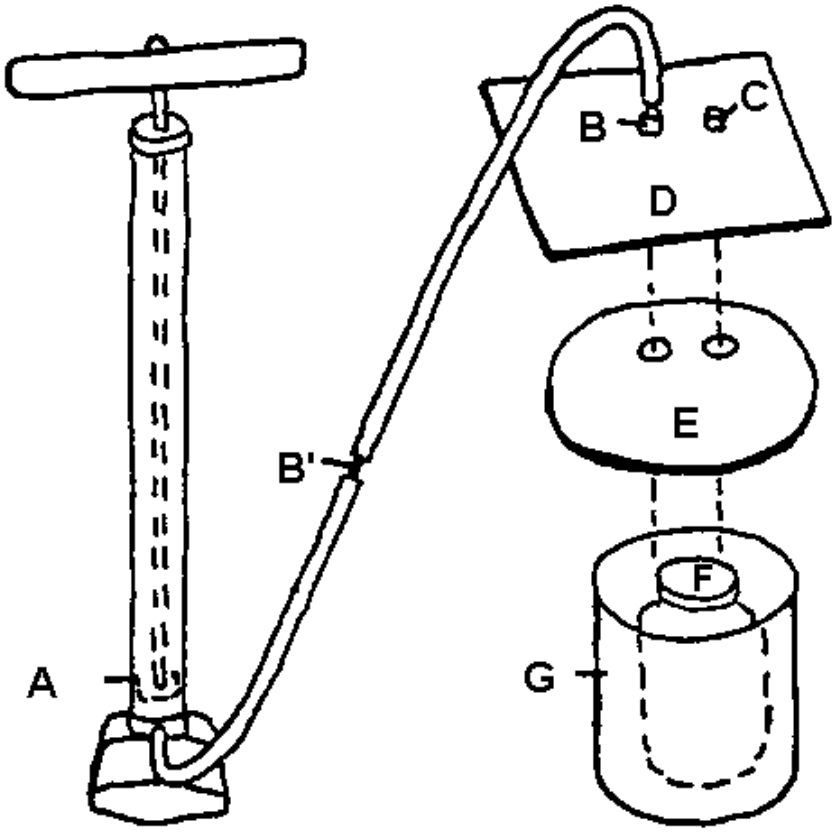

Figure 1. The vacuum packing system for seed storage.

Construction:
1. Disassemble the bicycle pump and reverse the leather or rubber cup on the end of the plunger rod (A).

2. Remove the check valve in the bicycle pump because it checks the airflow in the opposite direction. This check valve is located at or near either end of the hose. In some cases, the check valve can be disengaged by removing the valve, inverting it and reinserting the valve in the pump for storage.

3. Attach a "Presta" type bicycle inner tube stem valve (B) on the lid (D) or attach a "Schrader" type check valve (B') in-line with the hose that connects the modified bicycle pump to the lid (D). The "Schrader" valve core has spring tension. For ease of pumping, disable the spring tension by cutting and removing the spring. The "Presta" valve core does not have spring tension. The body of the "Presta" valve is threaded, which provides for ease of attachment on the lid (D). Both "Presta" and "Schrader" check valves must be attached in the proper direction to allow air to be evacuated from the vacuum chamber (G).

4. Drill or cut 2 holes in the lid (D) and rubber gasket (E). One hole is for the "Presta" valve or for a hose nipple when using an in-line "Schrader" valve. The other hole is for a rubber stopper (C). The lid should be thin and slightly flexible to facilitate the sealing of the uneven surface of the food can (G) with the gasket (E). A gasket (E) made from tire inner tube may have ridges, which provide air passageways and vacuum leakage. These ridges must be filed or sanded down flat.

5. Options:
   a. When using tall food jars (F), construct a taller vacuum Chamber (G) by soldering 2 cans together.
   b. A tall cooking pot can be used as the vacuum chamber (G).
   c. A pressure cooker can serve as the lid (D), gasket (E) and vacuum chamber (G).

Operation:

Place seeds in a jar with resealable lid (F) for example, a spaghetti sauce jar with “safety lock” or “pop up” button on the lid or canning jar with mason dome lids. Secure the jar lid by twisting it on snugly but not too tight so air can escape from the jar during evacuation. The jar is placed in the vacuum chamber (G). Cover the vacuum chamber with the rubber gasket (E) and lid (D). Cover the open hole with the rubber stopper (C). Attach the pump hose on to the lid stem valve ("Presta" valve) or hose nipple (when using an in-line "Schrader" valve). Evacuate the chamber and then release the vacuum rapidly by removing the rubber stopper (C). The rapid refilling of air into the chamber will slam the jar lid down and seal the jar.

A 6-inch (16 cm) diameter x 6.5-inch (17 cm) vacuum chamber requires 8 to 20 strokes on the modified bicycle pump 1.6-inch diameter x 24.4 inch (4 cm diameter x 62 cm) to attain a suitable vacuum for sealing. Under these conditions, 15 to 25 inches of mercury (50-to 80 kilopascal) suction can be achieved. Larger vacuum chamber requires more strokes.